CENWP-ODN-W (Sediment Quality) 12 October 2021

Memorandum for: Portland District Planning, Programs and Project Management (CENWP-PMF-P, Foster)

Subject: Sediment quality evaluation for the Navigation Lock 1 (NL1) stop log project, located at Bonneville Dam, in the Columbia River (river mile 146), Oregon and Washington.

Project and Sediment Sampling Summary: The original Navigation Lock 1 (NL1, red circle, Figure 1) is equipped with 13 emergency bulkheads designed to be placed in either the upstream or downstream bulkhead slots for maintenance or other purposes. The existing bulkheads are of riveted steel construction, are original to the lock, and have not been maintained since the second Navigation Lock 2 was constructed in 1993. The U.S. Army Corps of Engineers – Portland District (USACE) plans on replacing the stoplogs of NL1 to meet current USACE guidance (Tetra Tech 2021).

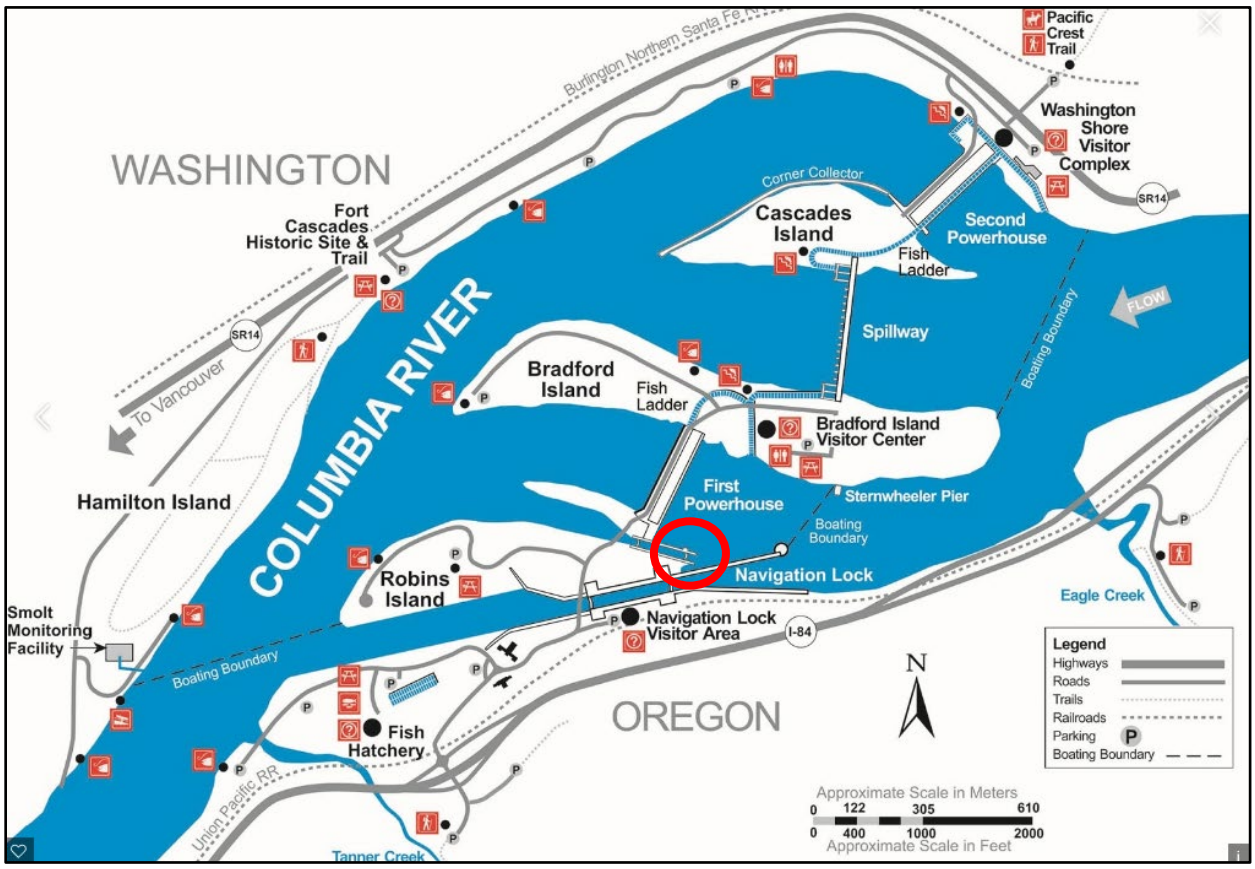


Figure 1. Detail of Bonneville Dam with navigation locks; NL1 project in red circle (Tetra Tech 2021).

To install the upstream stoplogs in NL1, native river sediments need to be removed. Approximately 1,650 cubic yards (CY) of sediment will be dredged by mechanical or hydraulic methods and potentially placed in river downstream of the dam via barge in the active flow areas. The accumulated river sediments in the stoplog area (102 ft long by 87 ft wide) are approximately five feet thick and sit upon the hardened (wood blocks) sill (floor) of the NL1 (Figure 2).

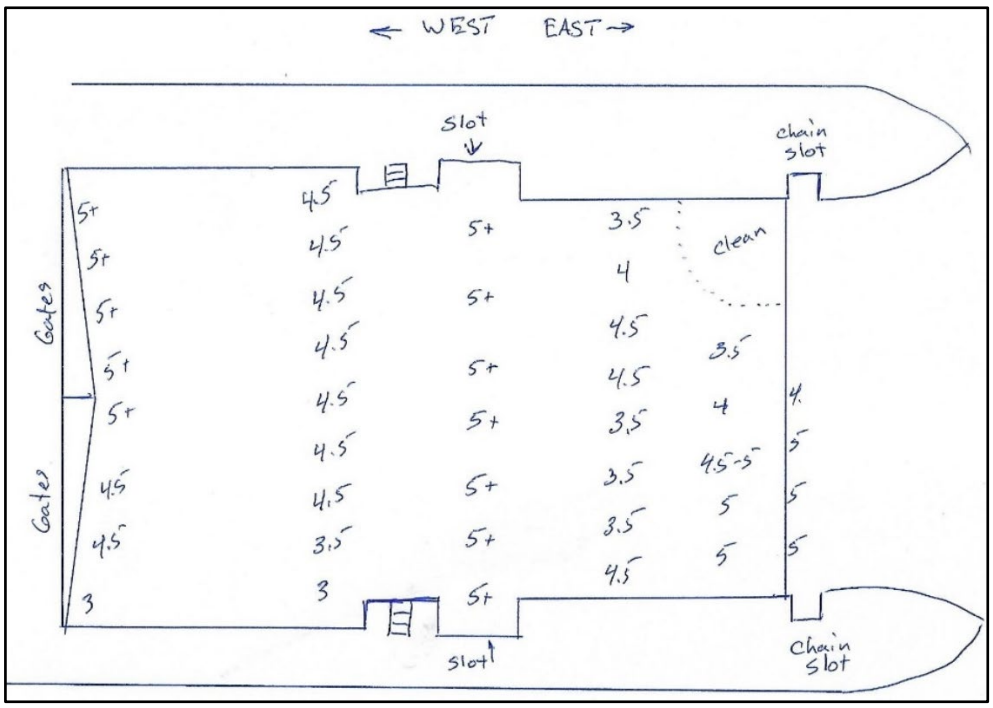


Figure 2. Approximate sediment thickness in NL1 upstream stoplog area (USACE).

On 12 August 2021, samples were collected to characterize sediments in the proposed dredge area for the upstream stop log project. Sediments were characterized per the 2018 *Sediment Evaluation Framework for the Pacific Northwest* (SEF). Details of the project and the sampling event appear in Table 1.

Table 1. Project and Sediment Sampling Summary

Sampling Staff (Corps)	James Holm, Dominic Yballe
Vessel, Operator	Bonneville Dam crew
Sampling Date	12 August 2021
Sampler Type	Standard Ponar grab sampler
Waterbody/Channel Mile	Columbia River, near river mile 145.5
Dredged Material Volume	~1,650 CY
No. Samples and Type	1 x 2-point composite sample
Station NL1-1 Latitude/Longitude (water depth)	45.638358° N / -121.945747° W (~27 ft)
Station NL1-2 Latitude/Longitude (water depth)	45.638342° N / -121.945605° W (~36 ft)
No. Samples Submitted to Laboratory	1 composite sample: NL1-COMP

Sediment was collected at both sampling stations in the upstream end of the original navigation lock (Figure 3). A two-point composite sample (from stations NL1-1, NL1-2) was submitted to Materials Testing and Consulting, Inc. (Olympia, WA) for physical analysis and to Analytical Resources, Inc. (Tukwila, WA) for chemical analysis. Chemical analytical results were compared to the SEF freshwater benthic toxicity screening levels (SLs). Samples were photographed (Figures 4 to 6). Figure 7 shows the NL1 sampling location. The field data form appears in Figure 8.

Results: Sediment physical and chemical analytical results are presented in Table 2. Chemical concentrations in the composite sediment sample (NL1-COMP) did not exceed any of the SEF freshwater SLs. Additionally, PCB Total Aroclors were not detected with a reporting limit of 4.0 ug/kg (U) and are below ODEQ's fish-based freshwater bioaccumulation screening level value of 22 ug/kg.

Table 2. Bonneville Dam NL1 Physical and Chemical Data Summary (sampled 12 August 2021).

Decision unit (Sample ID): Parameters	NL1-COMP	SEF $SL1_F$
Grain size (% gravel, sand, fines)		
gravel	2.2	--
sand	72.0	--
fines (silt + clay)	25.8 (21.6 + 4.2)	--
Total organic carbon (%)	0.98	--
Total solids (%)	57.91	--
Metals (mg/kg)		
Arsenic	2.73	14
Cadmium	0.25	2.1
Chromium	9.74	72
Copper	11.6	400
Lead	7.56	360
Mercury	0.0496	0.66
Nickel	11.2	26
Selenium	1.25	11
Silver	0.08	0.57
Zinc	78.7	3,200
PAHs (ug/kg)		
Total PAH's	166.4 J	17,000
Phthalates (ug/kg)		
Di-n-butyl phthalate	20.0 (5.6) U	380
Bis(2-ethylhexyl) phthalate	13.1 J	500
Di-n-octyl phthalate	20.0 (4.4) U	39
Phenols		
Phenol	20.0 (4.4) U	120
4-Methylphenol (p-cresol)	23.4	260
Pentachlorophenol	99.8 (31.2) U	1,200
Miscellaneous Extractable Compounds (ug/kg)		
Benzoic acid	75.9 J	2,900
Carbazole	8.1 J	900
Dibenzofuran	20.0 (14.1) U	200
Pesticides ug/kg)		
DDD (2,4' + 4,4' isomers)	1.00 (0.32) U	310
DDE (2,4' + 4,4' isomers)	1.00 (0.25) U	21
DDT (2,4' + 4,4' isomers)	1.00 (0.32) U	100
Dieldrin	1.00 (0.11) U	4.9
beta-Hexachlorocyclohexane	0.50 (0.09) U	7.2
Endrin ketone	1.00 (0.28) U	8.5
Polychlorinated Biphenyls - Aroclors (ug/kg)		
PCB-Aroclor 1016	4.0 (1.6) U	--
PCB-Aroclor 1221	4.0 (1.6) U	--
PCB-Aroclor 1232	4.0 (1.6) U	--
PCB-Aroclor 1242	4.0 (1.6) U	--
PCB-Aroclor 1248	4.0 (1.6) U	--
PCB-Aroclor 1254	4.0 (1.6) U	--
PCB-Aroclor 1260	4.0 (0.6) U	--
PCB-Aroclor 1262	4.0 (0.6) U	--
PCB-Aroclor 1268	4.0 (0.6) U	--
Total PCBs (except 1262 and 1268)	4.0 (1.6) U	110 (22†)
Butyltins (ug/kg)		
Monobutyltin	4.07 (1.88) U	540
Dibutyltin	5.76 (1.72) U	910
Tributyltin	3.85 (0.449) U	47
Tetrabutyltin	4.99 (4.99) U	97

U = Non-detection at the method reporting limit (MRL) or method detection limit (MDL), MRL reported (MDL in parentheses); J = Estimated value between MDL and MRL; † = ODEQ (2007) fish-based freshwater SLV for PCBs.

Conclusions: The sediments in the project area are suitable for unconfined, aquatic disposal. Based on bulk sediment concentrations, predominately coarse-grained sediments, high seasonal flows, and project location within an unused navigation lock, a "low" management area rank is appropriate. Project sediments should be reassessed in August 2028.

Contact: This memorandum was prepared by James Holm (Sediment Quality Specialist) and reviewed by Dominic Yballe (Sediment Quality Specialist). Questions regarding memorandum should be directed to James Holm at (503) 808-4963 or e-mail to: james.a.holm@usace.army.mil.

References:

Northwest Regional Sediment Evaluation Team (RSET). 2018. *Sediment Evaluation Framework for the Pacific Northwest*. Prepared by the RSET agencies. May 2018. 278 pp with appendices.

Oregon Department of Environmental Quality (ODEQ). 2007. *Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment*. Updated April 3, 2007 by ODEQ Environmental Cleanup Program, 18 pp with appendices.

Tetra Tech. 2021. *Bonneville Navigation Lock 1 Concrete Stoplogs Plans and Specification – Design Document Report*. Prepared for the USACE Portland District. May 2021. 54 pp with appendices.

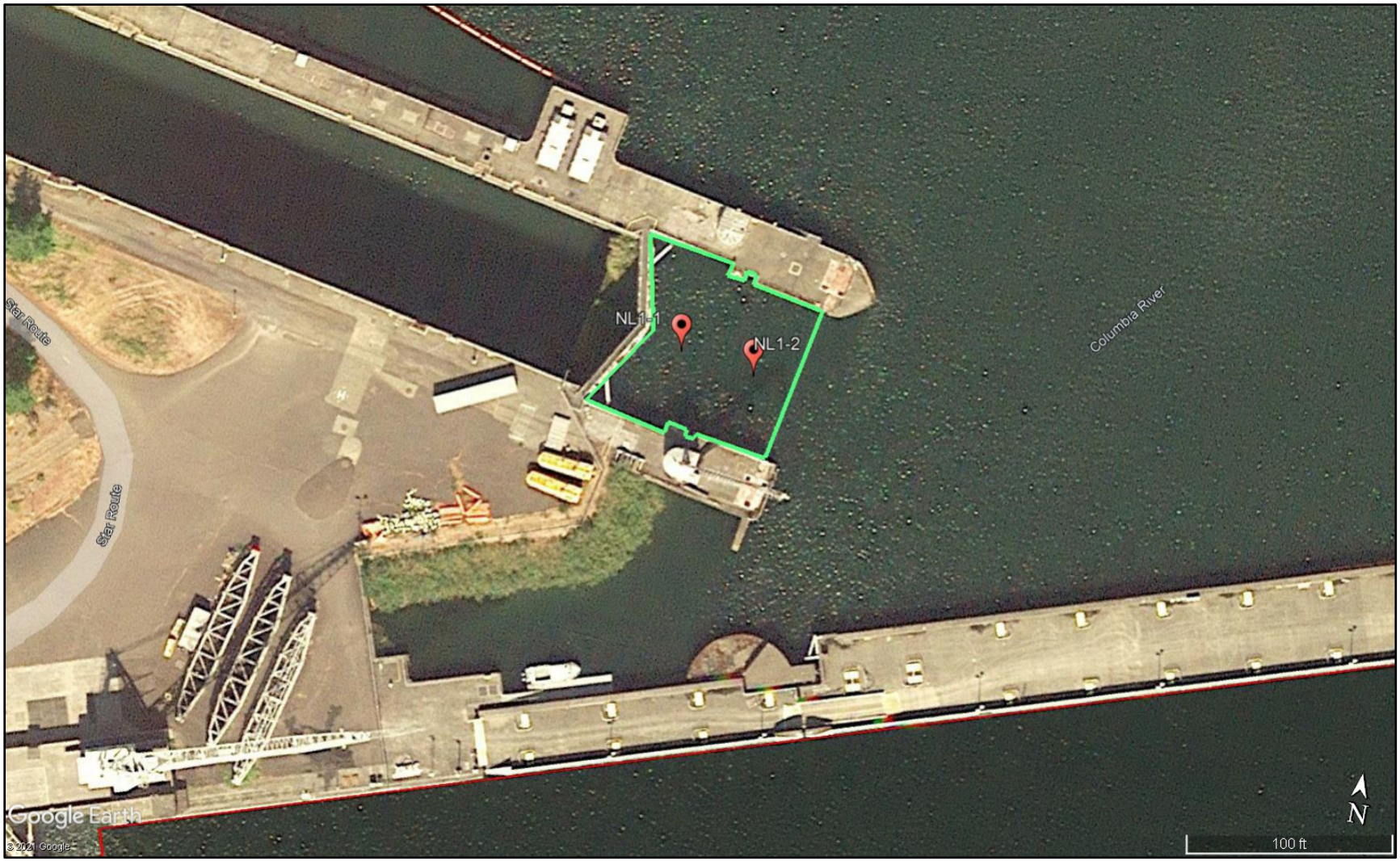


Figure 3. Bonneville Dam NL1 stop log actual sediment sampling stations (sampled 12 August 2021).

Figure 4. Sediment sample from station NL1-1.

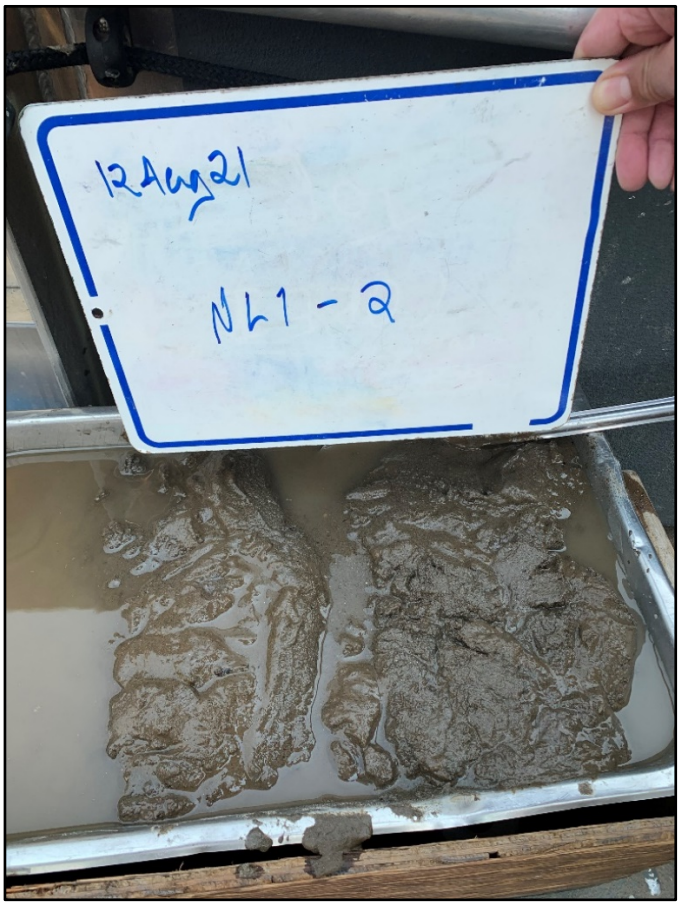


Figure 5. Sediment sample from station NL1-2.

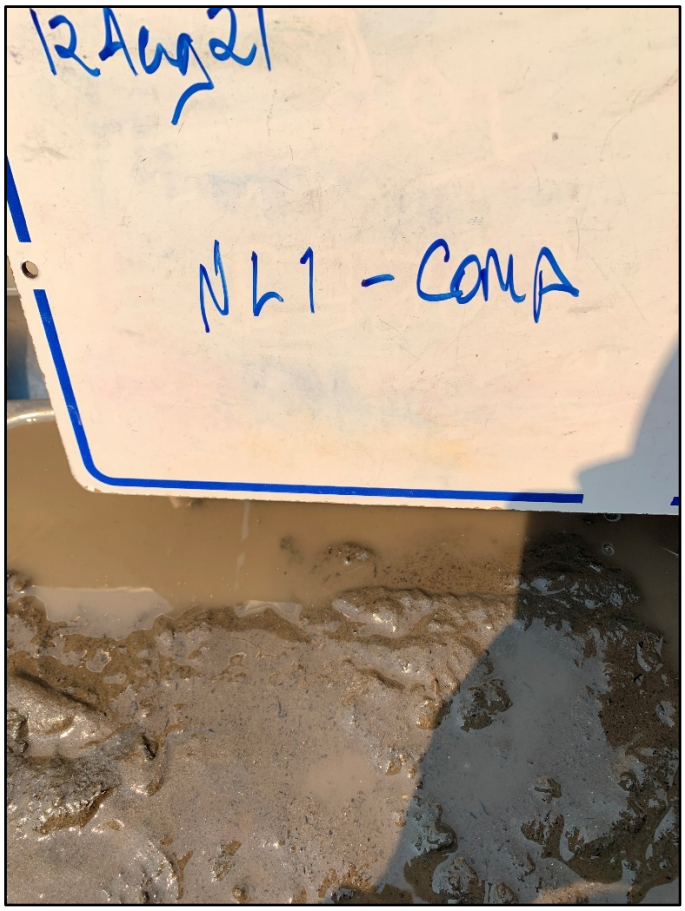
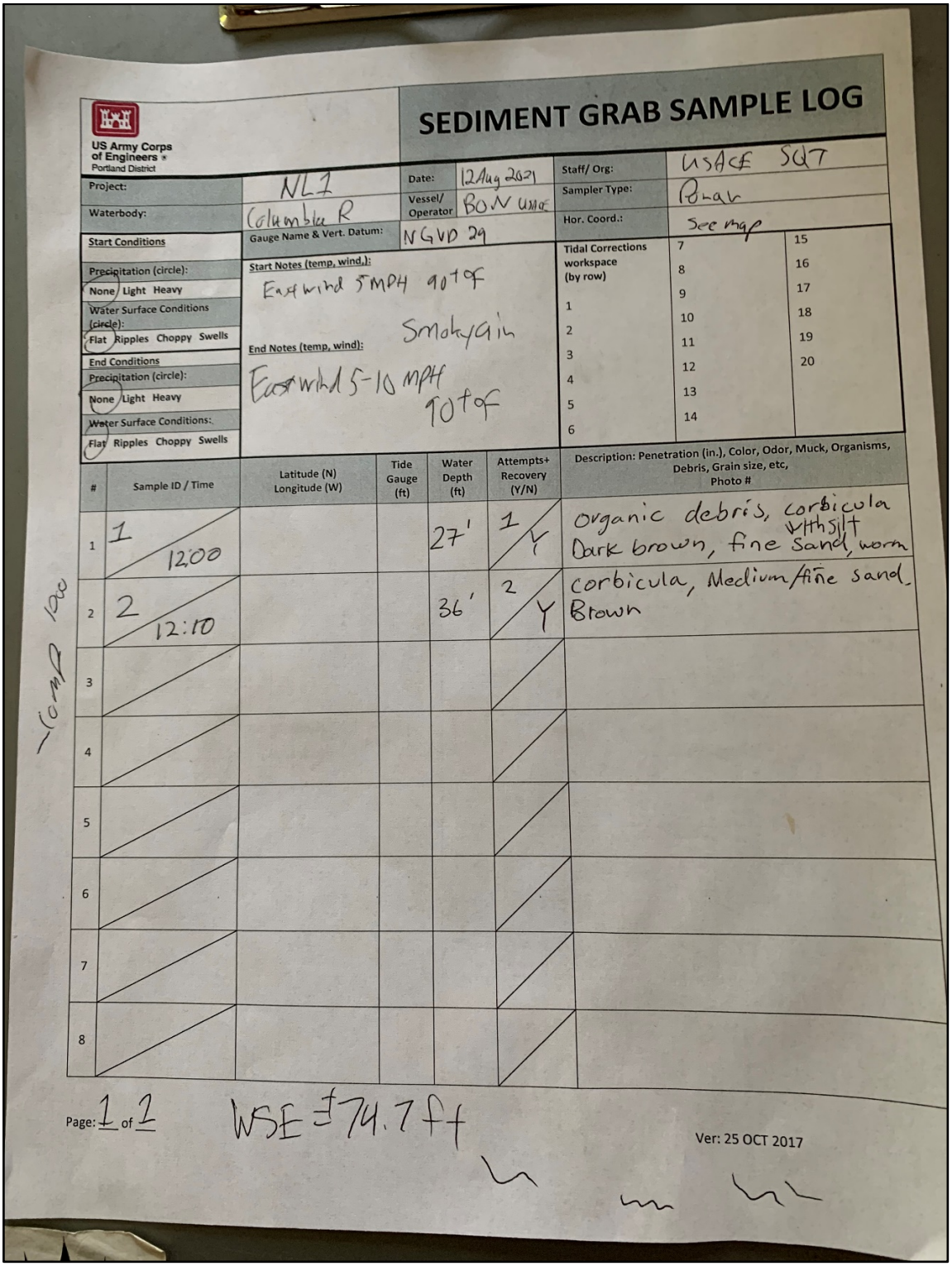


Figure 6. Composite sediment sample (120821-NL1-COMP).

Figure 7. Facing west, a view of the upstream end of the Navigation Lock 1.



US Army Corps of Engineers
Portland District

SEDIMENT GRAB SAMPLE LOG

Project:	NL1	Date:	12 Aug 2021	Staff/ Org:	USACE SQT
Waterbody:	Columbia R	Vessel/ Operator	BON USACE	Sampler Type:	Ponar
Start Conditions	Gauge Name & Vert. Datum:	NGVD 29		Hor. Coord.:	See map

Precipitation (circle): None / Light Heavy
Water Surface Conditions (circle): Flat Ripples Choppy Swells

Start Notes (temp, wind,): East wind 5MPH 90+of Smoky/Gin

End Conditions
Precipitation (circle): None / Light Heavy
Water Surface Conditions: Flat Ripples Choppy Swells

End Notes (temp, wind): East wind 5-10 MPH 90+of

Tidal Corrections workspace (by row)

1	7	15	
2	8	16	
3	9	17	
4	10	18	
5	11	19	
6	12	20	
	13		
	14		

#	Sample ID / Time	Latitude (N) Longitude (W)	Tide Gauge (ft)	Water Depth (ft)	Attempts+ Recovery (Y/N)	Description: Penetration (in.), Color, Odor, Muck, Organisms, Debris, Grain size, etc, Photo #
1	1 / 12:00			27'	1 / Y	Organic debris, corbicula with silt Dark brown, fine sand, worm
2	2 / 12:10			36'	2 / Y	corbicula, Medium/fine sand, Brown
3						
4						
5						
6						
7						
8						

~COMP 100

Page: 1 of 1

WSE ±74.7 ft

Ver: 25 OCT 2017

Figure 8. Grab sample data form (BL1, 12 August 2021).